
NAVFAC IGS-13931 (FEBRUARY 2003)

Preparing Activity: LANTNAVFACENGCOM Based on UFGS-13931

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 13931

FIRE EXTINGUISHING SPRINKLER SYSTEMS (RESIDENTIAL)
02/03

NOTE: This guide specification is issued by the
Atlantic Division, Naval Facilities Engineering
Command for regional use in Italy.

NOTE: This guide specification covers requirements
for automatic wet pipe fire extinguishing sprinkler
systems for one- and two-family dwellings, for
multi-family housing, and for residential
occupancies of four stories and less. System
requirements shall conform to MIL-HDBK-1008B, "Fire
Protection for Facilities Engineering, Design, and
Construction"; NFPA 13D, "Installation of Sprinkler
Systems in One- and Two-Family Dwellings and
Manufactured Homes"; NFPA 13R, "Installation of
Sprinkler Systems in Residential Occupancies Up To
and Including Four Stories in Height"; NFPA 13,
"Installation of Sprinkler Systems" where guidance
is not provided in NFPA 13D or NFPA 13R. Use NFPA
13D for single family dwellings, duplexes, and
manufactured homes. Use NFPA 13R for townhouses,
apartment buildings, and bachelor quarters type
buildings of four stories and less.

Comments and suggestion on this specification are
welcome and should be directed to the technical
proponent of the specification. A listing of the
technical proponents, including their organization
designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer
choices or locations where text must be supplied by
the designer.

NOTE A: The following information shall be shown on project drawings:

1. Do not show the detailed sprinkler system new layout on contract drawings.
2. Location and detail of each sprinkler system supply riser, alarm valve, water motor alarm, fire department inlet connection, pressure or flow switch, fused disconnect switch, electric bell, riser check valves, and associated electrical connections.
3. Location where each sprinkler system begins including connection to water distribution system piping.
4. Location of sprinkler system control valves, post indicator valves, wall indicator valves, backflow preventers, drain valves, and test connections.
5. Area of sprinkler system coverage when system is protecting partial areas.
6. Details of anchoring piping, including pipe clamps and tie rods, or mechanical retainer glands.
7. Indicate existing sprinkler piping layout and sprinkler heads on project drawings only if existing sprinkler system is being modified and such layout is necessary for clarity.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651 (1992) Disinfecting Water Mains

ITALIAN ELECTROTECHNICAL COMMITTEE STANDARDS (CEI)

NOTE: A CEI Norm is an Italian technical normative for electrical systems recognized by Italian Law, submitted by a private organization "Comitato Elettrotecnico Italiano" for the Italian

territory, available in the Italian language and
only in some cases in English.

CEI 64-8/V1/V2 (1998/01/01) Electrical installations of
buildings

ITALIAN LAWS AND NORMS (D.M.)(LAW)(CIRC.)

NOTE: Italian laws and normatives are the
legislative regulations and decrees issued by the
Italian government in the form of laws, norms,
decrees, circulars, and letters. These Laws and
Decrees concur together with Norms and Standards
in forming the governing directives for
construction.

Law 46 (5/3/1990) Regulations for safety of
systems

D.P.R. 447 (06/12/1991) Regulation of accomplishment
of Law 46/90 concerning safety of systems

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

NOTE: A UNI Norm is a technical normative
recognized as Italian Law, submitted by a private
organization "Ente Nazionale Italiano di
Unificazione" for Italy and is available only in
the Italian language. It is the National Standard.

UNI 2223 (1967) Metallic pipe flanges - Templates
for drilling circular flanges

UNI 5311 (1963) Gripping and holding appliances -
Straps, clamps, squares and bearings -
Summary of standard types

UNI 5336 (1969) Pipes, fittings and special
castings for grey cast iron pressure main
lines. Qualities, requirements and tests

UNI 6363/FA-199 (1984/86) Welded and seamless steel tubes
for water mains

UNI 6884 (1987) Shutting and regulation valves for
fluids - Supply and test conditions

UNI 7125/FA-109 (1972/82) Flanged gate valves for water

	pipelines - Technical conditions of delivery
UNI 7145	(1972) Pipe clamps for use on board ships - Summary of standard types
UNI 8863/FA-1	(1987/89) Unalloyed steel seamless and welded tubes suitable for screwing in accordance with UNI ISO 7/1
UNI 9157	(1988) Water supply - Back flow preventer - Characteristics and tests
UNI 9489	(1989) Fire fighting equipment - Sprinkler fire extinguishing systems
UNI 9490	(1989) Fire fighting equipment - Water supply for automatic fire fighting systems

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN)
(UNI EN ISO)(UNI ISO)

NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI ISO is a European Standard with a coincident Italian National Standard or International Standard. The two standards are identical, with most (but not all) EN's available in the English language and the UNI available only in the Italian language.

UNI EN 545	(1995) Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods
UNI EN 1057	(1997) Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications
UNI EN 1254-1	(2000) Copper and copper alloys - Plumbing fittings - Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes
UNI EN 1254-2	(2000) Copper and copper alloys - Plumbing fittings - Part 2: Fittings with compression ends for use with copper tubes
UNI EN 1452-2	(2001) Plastics piping systems for water supply - Unplasticized poly(vinyl chloride) (PVC-U) - Part 2: Pipes
UNI EN 1452-3	(2001) Plastics piping systems for water

supply - Unplasticized poly(vinyl chloride) (PVC-U) - Part 3: Fittings

UNI EN 10242/A1	(2001/01) Threaded pipe fitting in malleable cast iron
UNI EN 12259-1	(2002) Fixed firefighting systems - Components for sprinkler and water spray systems - Sprinklers
UNI EN 12259-2	(2002) Fixed firefighting systems - Components for sprinkler and water spray systems - Wet alarm valve assemblies
UNI EN 12259-3	(2002) Fixed firefighting systems - Components for sprinkler and water spray systems - Dry alarm valve assemblies
UNI EN 12259-4	(2002) Fixed firefighting systems - Components for sprinkler and water spray systems - Water motor alarms

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13	(1999) Installation of Sprinkler Systems
NFPA 13D	(1999) One- and Two-Family Dwellings and Manufactured Homes Sprinkler Systems
NFPA 13R	(1999) Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems
NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 72	(1999) National Fire Alarm Code

UNDERWRITERS LABORATORIES (UL)

UL FPED	(1999) Fire Protection Equipment Directory
UL 789	(1993; R 1994) Indicator Posts for Fire-Protection Service

1.2 SYSTEM DESCRIPTION

Design and provide [new and modify existing] automatic wet pipe fire extinguishing sprinkler systems for complete fire protection coverage throughout [____], except sprinklers may be omitted from areas as allowed by [NFPA 13D] [NFPA 13R].

1.3 SPRINKLER SYSTEM DESIGN

NOTE: Use NFPA 13D for single family dwellings, duplexes, and manufactured homes. Use NFPA 13R for townhouses, apartment buildings, and bachelor quarters type buildings of four stories and less.

Design automatic wet pipe fire extinguishing sprinkler systems in accordance with UNI 9489, Law 46 and D.P.R. 447, and the required and advisory provisions of [NFPA 13D] [NFPA 13R] [manufacturer's recommendations] by hydraulic calculations, except as modified herein. Each system shall include materials, accessories, and equipment inside and outside the building to provide each system complete and ready for use. Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed working drawings to be submitted for approval. Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air supply diffusers. Provide sprinkler heads and piping system layout. Devices and equipment for fire protection service shall be approved for use in wet pipe sprinkler systems.

1.3.1 Location of Sprinkler Heads

Location of heads in relation to the ceiling and the spacing of sprinkler heads shall comply with UNI 9489 and UNI EN 12259-1, and that permitted by [NFPA 13D] [NFPA 13R] [NFPA 13] [manufacturer's recommendations].

1.3.2 Design Discharge

Discharge shall be at least 1.14 L/s from any single sprinkler and not less than 0.82 L/s per sprinkler for the number of sprinklers required. [Design discharge area shall be in accordance with the listed sprinkler criteria.]

1.3.3 Number of Design Sprinklers

The number of design sprinklers shall include sprinklers within a compartment to a maximum of [two for an NFPA 13D system] [four for an NFPA 13R system].

1.3.4 Friction Losses

Calculate losses in piping in accordance with the Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 150 for plastic piping, except that friction loss may be based upon available manufacturer's data for specially listed piping products.

1.3.5 Water Supply

Base hydraulic calculations on a static pressure of [_____] kPa (gage) with [_____] L/s available at a residual pressure of [_____] kPa (gage) at the [_____].

1.3.6 Outside Hose Allowances

Hydraulic calculations shall include an allowance of [_____] L/s for outside hose streams.

1.3.7 Detail Working Plan Drawings

Prepare A1 size (594 by 841 mm) detail working plan drawings of sprinkler heads and piping system layout in accordance with [NFPA 13D] [NFPA 13R]. Show data essential for proper installation of each system. Show details, plan view, elevations, and sections of the systems supply and piping. Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams. [Submit working plan drawings signed by a Registered Fire Protection Engineer.]

1.3.8 As-Built Drawings

After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes. Submit 600 by 900 mm drawings on reproducible mylar film with title block similar to full size contract drawings. Furnish the as-built (record) working drawings in addition to as-built contract drawings required by Division 1, "General Requirements."

1.4 SUBMITTALS

NOTE: The "G" in submittal tags following each submittal item indicates Government approval and should be retained. Submittal items not designated with a "G" will be approved by the QC organization.

Submit in accordance with Section 01330, "Submittal Procedures." The EFAMED, Naval Facilities Engineering Command, Fire Protection Engineer, will review and approve submittals in this section requiring Government approval.

SD-02 Shop Drawings

Sprinkler heads and piping system layout; G

Electrical wiring diagrams; G

SD-03 Product Data

Piping; G

Alarm valves; G

Valves, including gate, check, and globe; G

Water motor alarms; G

Sprinkler heads; G

Pipe hangers and supports; G

[Pressure] [or] [flow] switch; G

Fire department connections; G

Alarm bells; G

Mechanical couplings; G

Backflow prevention assemblies; G

Valve tamper switch; G

Annotate descriptive data to show the specific model, type, and size of each item.

SD-05 Design Data

Sprinkler system design; G

Submit computer program generated hydraulic calculations to substantiate compliance with hydraulic design requirements. Submit name of software program used.

SD-06 Test Reports

Preliminary tests on piping system; G

SD-07 Certificates

Qualifications of installer; G

SD-10 Operation and Maintenance Data

Alarm valves, Data Package 3; G

Submit in accordance with Section 01781, "Operation and Maintenance Data."

SD-11 Closeout Submittals

As-built drawings of each system; G

1.5 QUALITY ASSURANCE

1.5.1 Qualifications of Installer

Prior to installation, submit data showing that the Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a firm contractual agreement with a subcontractor having such required experience. Data shall include names and locations of at least two installations where the Contractor, or the

subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Aboveground Sprinkler Piping

The following manufacturers provide components and materials for aboveground sprinkler piping systems that generally comply with these specifications:

OPPO Gesuino
Via Amerigo Vespucci, 1
09074 Ghilarza (OR)
Tel: 0785/54642
www.oppo.it

IDROSTAR S.n.c.
Via Pascoli, 17
28040 Dormelletto (NO)
Tel: 0322/497245
Fax: 0322/498184

DALMINE
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) Italy
Tel: 035/560.111
Fax: 035/560.381
www.dalmine.it

IANNONE ARM S.p.A.
Via Nuova Villa, 29
80100 Napoli
Tel: 081-7523788
Fax: 081-7523425

IANNONE TUBI s.r.l.
via Biagio Accolti Gil - zona industriale
Bari
Tel: 080-5311448
Fax: 080-5312976

2.1.2 Sprinkler Heads

The following manufacturers provide sprinkler head components that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430

Telefax: 0471/981127
www.vetribagno.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.3 Sprinkler Head Cabinet

The following manufacturers provide sprinkler head cabinets that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

2.1.4 Alarm Valves

The following manufacturers provide alarm valves that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

KSB ITALIA S.p.A.
viale Tunisia, 46
20214 Milano
Tel: 02-6274-3273
Fax: 02-6698-3272

VALVOSTEEL s.r.l.
via dei Mille, 7
20098 San Giuliano Milanese
Tel: 02-9849-0956
Fax: 02-9840-169

RAIMONDI VALVOLE S.p.A.
via Castellana, 47
20027 Rescaldina - Milano
Tel: 0331-575111
Fax: 0331-464772

2.1.5 Water Motor Alarms

The following manufacturers provide water motor alarms that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.6 Pressure and Flow Switches

The following manufacturers provide pressure and flow switches that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.7 Alarm Bells

The following manufacturers provide alarm bells that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

GENERAL FIRE
Via Casilina, 159
00176 Roma
Tel: 06/70301043/9
Fax: 06/70301043
www.generalfire.it

2.1.8 Valve Tamper Switch

The following manufacturers provide valve tamper switches that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

2.1.9 Pipe Hangers and Supports

The following manufacturers provide components and materials for pipe hangers and support systems that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

PROSYSTEM
Via dell'Industria, 2
30031 Arino di Dolo (VE)
Tel: 041/5101622
Fax: 041/5131351
E-Mail: info@prosystemitalia.com
www.prosystemitalia.com

VIKING ITALIA srl (KING SYSTEM)
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.10 Aboveground Valves

The following manufacturers provide various types of valves for sprinkler systems that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

RIP Rubinetterie Industriali Piemontesi S.p.A.
Via Reycend, 10
10148 Torino
Tel: 011/2203444
Fax: 011/2165981

MARIANI RUBINETTERIE INDUSTRIALI srl
Via per Valduggia, 12
13011 Borgosesia (VC)
Tel: 0163/23368
Fax: 0163/27900
www.marianirubinetteria.it

KSB ITALIA S.p.A.
viale Tunisia, 46
20214 Milano
Tel: 02-6274-3273
Fax: 02-6698-3272

VALVOSTEEL s.r.l.
via dei Mille, 7
20098 San Giuliano Milanese
Tel: 02-9849-0956
Fax: 02-9840-169

RAIMONDI VALVOLE S.p.A.
via Castellana, 47
20027 Rescaldina - Milano
Tel: 0331-575111
Fax: 0331-464772

2.1.11 Identification Signs

The following manufacturers provide components and materials for identification signs that generally comply with these specifications:

SETON ITALIA S.r.l.
Via Lazzaroni, 7
21047 Saronno - VA
Tel: 02-96703198
Fax: 02-96703644
www.seton.it

GENERAL FIRE
Via Casilina, 159
00176 Roma
Tel: 06/70301043/9
Fax: 06/70301043
www.generalfire.it

2.1.12 Backflow Prevention Assemblies

The following manufacturers provide backflow prevention assemblies that generally comply with these specifications:

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

T.F. PIPING
Via Anicio Paolino, 6
00178 Roma
Tel: 06/7809997
Fax: 06/7801719
www.tfpiping.com

CAZZANIGA S.p.A.
Via Parcco
20046 Biazzone (MI)
Tel: 039-36321
Fax: 039-3632222

INTERMES S.p.A.
Via Bellini, 30
20095 cusano Milanino (MI)
Tel: 02-6195726
Fax: 02-6194247

2.1.13 Fire Department Connections

The following manufacturers provide fire department connections that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

ZIGGIOTTO & C. Srl
Viale del Lavoro, 4 - Fraz. Tombazosana
37055 Ronco all'Adige (VR)

Tel: 045/7000427
Fax: 045/6609022
www.ziggiotto.it

BOCCIOLONE ANTINCENDIO
Z.I. Roccapietra
13019 Varallo Sesia (VI)
Tel: 0163-568811
Fax: 0163-560048/560261

VIKING ITALIA srl
Via Leonardo da Vinci, 46
20030 Senago (MI)
Tel: 02/99010112
Fax: 02/99010041
www.vikingcorp.com

2.1.14 Buried Pipe and Fittings

The following manufacturers provide components and materials for buried sprinkler pipe and fittings systems that generally comply with these specifications:

DALMINE Resine
Sede legale e Amministrativa
41100 Modena
Tel: 059/826307
Fax: 059/827090
Ufficio Vendita Nord-Estero
24040 Levate (BG)
Tel: 035/594848
Fax: 035/594832

PLASTIFORM
Via Enrico Fermi, 366
45024 Fiesse Umbertino (Rovigo)Italy
Tel: 39 0425 741072
Fax: 39 0425 741073

LARETER S.p.A
Via Occhiobello 732
45024 Fiesse Umbertino (Rovigo)
Tel: ++39 0425 745511
Fax: ++39 0425 754625
www.lareter.it

FRA.BO S.p.A
Via Circonvallazione, 7
26020 Bordolalno (CR)
Tel: 0372/925188
Fax: 0372/95886
www.frabo.net

OPPO Gesuino

Via Amerigo Vespucci, 1
09074 Ghilarza (OR)
Tel: 0785/54642
www.oppo.it

IDROSTAR S.p.A.
Via Giolitti, 94
12030 Torre San Giorgio (CN)
Tel: 0172/921023
Fax: 0172/96246
www.idrostar.it

2.1.15 Buried Sprinkler Valves

The following manufacturers provide buried sprinkler valves that generally comply with these specifications:

RIP Rubinetterie Industriali Piemontesi S.p.A.
Via Reycend, 10
10148 Torino
Tel: 011/2203444
Fax: 011/2165981

2.1.16 Post Indicator Valves

The following manufacturers provide post indicator valves that generally comply with these specifications:

TUBI GHISA
Direzione: Via E. Romagnoli, 6
20146 Milano
Tel: 02/42431
Stabilimento: via Allegro, 1
16016 Cogoleto (GE)
Tel: 010/91711
Fax: 010/9171401

ZIGGIOTTO & C. Srl
Viale del Lavoro, 4 - Fraz. Tombazosana
37055 Ronco all'Adige (VR)
Tel: 045/7000427
Fax: 045/6609022
www.ziggiotto.it

LA POLITERMICA
via Macello, 51
39100 Bolzano
Tel: 0471-971430
Fax: 0471-981127
www.vetribango.com

2.1.17 Buried Utility Warning and Identification Tape

The following manufacturers provide buried utility warning and

identification tape systems that generally comply with these specifications:

SETON ITALIA S.r.l.
Via Lazzaroni, 7
21047 Saronno - VA
Tel: 02-96703198
Fax: 02-96703644
www.seton.it

GENERAL FIRE
Via Casilina, 159
00176 Roma
Tel: 06/70301043/9
Fax: 06/70301043
www.generalfire.it

2.2 ABOVEGROUND PIPING SYSTEMS

Provide fittings for changes in direction of piping and for connections. Make changes in piping sizes through tapered reducing pipe fittings; bushings shall not be permitted. Perform welding in the shop; field welding shall not be permitted. Conceal piping in areas with [suspended ceiling] [and] [_____].

2.2.1 Sprinkler Piping

[NFPA 13D] [NFPA 13R], UNI EN 1057, UNI 5336, UNI 6363/FA-199, UNI 8863/FA-1, and UNI 9489, except as modified herein. Steel piping shall be Schedule 40 for sizes less than 80 mm, and Schedule 10 for sizes 80 mm and larger. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied shall not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe sizes 40 mm and larger. Fittings shall be UNI EN 545, UNI EN 1254-1, UNI EN 1254-2, UNI 2223, and UNI EN 10242/A1, or UL FPED listed for use in wet pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Steel piping with wall thickness less than Schedule 40 shall not be threaded. Side outlet tees shall not be permitted. [Sprinkler piping shall be metal.] [Avoid running sprinkler piping in attics and other areas subject to freezing.]

2.2.2 Sprinkler Heads

Release element of each head shall be of the [ordinary] [_____] temperature rating or higher as suitable for the specific application. Provide polished stainless steel ceiling plates or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings. Provide sprinkler heads in accordance with UNI 9489 and UNI EN 12259-1 or UL listed [residential] [quick response] sprinkler heads in accordance with [NFPA 13D] [NFPA 13R]. No o-rings will be permitted in sprinkler heads.

2.2.3 Cabinet

NOTE: In townhouses, it is not desirable to have spare cabinets with sprinkler heads accessible to residents. Spare heads should be turned over to the activity housing officer or public works department.

Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to the system riser. The number and types of extra sprinkler heads shall be as specified in UNI 9489 and [NFPA 13D] [NFPA 13R].

2.2.4 Alarm Valves

NOTE: Alarm valves are not required for NFPA 13D systems. Alarm valves are required for NFPA 13R systems installed in apartment buildings and bachelor quarters type buildings, but are not required for NFPA 13R systems installed in townhouses.

Provide variable pressure type alarm valve complete with retarding chamber, alarm test valve, alarm shutoff valve, drain valve, pressure gages, accessories, and appurtenances for proper operation of the system.

2.2.5 Water Motor Alarms

NOTE: Water motor alarms are not required for NFPA 13D systems. Water motor alarms are required for NFPA 13R systems installed in apartment buildings and bachelor quarters type buildings, but are not required for NFPA 13R systems installed in townhouses.

UNI EN 12259-4. Provide alarms of the approved weatherproof and guarded type, to sound locally on the flow of water in each corresponding sprinkler system. Mount alarms on the outside of the outer walls of each building at a location as directed. Provide separate drain piping directly to exterior of building.

2.2.6 [Pressure] [or] [Flow] Switch

NOTE: Pressure/flow switches are not required when using the NFPA 13D combined multipurpose domestic/fire system. Provide a pressure switch when an alarm valve is used, otherwise provide a flow switch. Do not install a shutoff valve in the piping between the alarm valve and the pressure

switch.

Provide switch with circuit opener or closer for automatic transmittal of an alarm over the facility fire alarm system. [Connect into the building fire alarm system.] [Connection of switch shall be under Section 13852, "Interior Fire Alarm System."] [Alarm actuating device shall have mechanical diaphragm controlled retard device adjustable from 10 to 60 seconds and shall instantly recycle.]

2.2.7 Alarm Bells

NOTE: Alarm bells are required for NFPA 13D systems. Alarm bells are required for NFPA 13R systems installed in townhouses, but are not required for NFPA 13R systems installed in apartment buildings and bachelor quarters type buildings.

Provide surface mounted [100], [150] or [200] mm diameter [weatherproof] vibrating bell having a sound output rating of at least 88 decibels at 3 meters. Mount on [interior] [exterior] surface of an [interior] [exterior] wall [on end of dwelling unit facing the street] [as directed]. Mounting height shall be at least [3] [_____] meters above finished grade. Provide for local alarm only.

2.2.8 Valve Tamper Switch

NOTE: Valve supervisory switches are required for NFPA 13R systems, not NFPA 13D systems.

Provide valve tamper switch(es) to monitor the open position of valve(s) controlling water supply to the sprinkler system. Switch contacts shall transfer from the normal position to the off-normal position during the first two revolutions of the hand wheel or when the stem of the valve has moved not more than one-fifth of the distance from its normal position. Switch shall be tamper resistant. Removal of the cover shall cause switch to operate into the off-normal position. Connection to the fire alarm system shall be in accordance with [Section [13852], "Interior Fire Alarm System"] [NFPA 72] [CEI 64-8/V1/V2].

2.2.9 Pipe Hangers and Supports

Provide in accordance with UNI 9489, UNI 5311, UNI 7145 and [NFPA 13D] [NFPA 13R]. [Attach to steel joists with Type 19 or 23 clamps and retaining straps.] [Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps.] [Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter.] [Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer.] [Attach to concrete with Type 18 insert or drilled expansion anchor.]

2.2.10 Valves

NOTE: Include last bracket for NFPA 13D systems.
Include last bracket for NFPA 13R system installed
in townhouses, but delete for systems that have
alarm check valves.

NOTE: Sprinkler coverage is prohibited from elevator
hoistways (UNI 9489 para 12.3), machine rooms, and
machinery spaces by Italian regulations.

UNI 9489, UNI 6884, UNI 7125/FA-109, and [NFPA 13D] [NFPA 13R]. Provide
[indicating valves] [indicating valves with tamper switches] of types
listed for fire service. Gate valves shall open by counterclockwise
rotation. [Check valves shall be flanged clear opening swing-check type
with flanged inspection and access cover plate for sizes 65 mm and larger.]
[Provide a single control valve arranged to shut off the domestic water and
the sprinkler system and a separate shutoff valve for domestic water only.]

2.2.11 Identification Signs

[NFPA 13D] [NFPA 13R]. Attach properly lettered and approved metal signs
to each valve and alarm device. [Permanently affix hydraulic design data
nameplates to the riser of each system.]

2.2.12 Backflow Prevention Assemblies

Provide [reduced pressure principle,] [double check,] [dual check]
[detector check] type backflow prevention assemblies that are in accordance
with UNI 9157.

2.2.13 Inspector's Test Connection

Provide test connections approximately 1.83 meters above the floor for each
sprinkler system or portion of each sprinkler system equipped with an alarm
device; locate at the hydraulically most remote part of each system.
Provide test connection piping to a location where the discharge shall be
readily visible and where water may be discharged without property damage.
Provide discharge orifice of same size as corresponding sprinkler orifice.

2.2.14 Main Drains

Provide separate drain piping to discharge at safe points outside each
building or to sight glasses attached to drains of adequate size to readily
receive the full flow from each drain under maximum pressure. The
discharge shall be readily visible and shall flow to a location that will
not cause property damage. Provide auxiliary drains as required by UNI 9489
and [NFPA 13D] [NFPA 13R].

2.2.15 Fire Department Connections

**NOTE: Delete this paragraph for NFPA 13D systems.
Use this paragraph for NFPA 13R systems with alarm
check valves.**

UNI 9489 and UNI 9490. Provide connections approximately one meter above finish grade, of the approved two-way type in accordance with UNI 9489 and UNI 9490, with 65 mm national standard female hose threads with plug, chain, [plastic breakaway caps,] and identifying fire department connection escutcheon plate.

2.3 BURIED WATER PIPING SYSTEMS

2.3.1 Pipe and Fittings

UNI EN 1057, UNI EN 1254-1, UNI EN 1254-2, UNI EN 1452-2, and UNI EN 1452-3 [NFPA 13D] [NFPA 13R]. Provide polyvinyl chloride (PVC) piping, chlorinated polyvinyl chloride (CPVC) piping, or Type K copper tubing. Provide a dielectric union between copper piping and any metal piping. Minimum pipe size shall be [_____] mm. Minimum depth of cover shall be [one] [_____] meter at finish grade. [Piping beyond 1.50 meters outside of building walls shall be provided under Short Form Section 02510, "Water Distribution."]

2.3.2 Valves

Provide as required by NFPA 24 and UNI 9489. Control valves shall conform to UNI 6884 and UNI 7125/FA-109 and shall open by counterclockwise rotation.

2.3.3 Post Indicator Valves

**NOTE: Post indicator valves are only required for
NFPA 13R systems.**

Provide with operating nut located about one meter above finish grade. Gate valves for use with indicator post shall conform to UNI 6884 and UNI 7125/FA-109. Indicator posts shall conform to UL 789. Provide each indicator post with one coat of primer and two coats of red enamel paint.

2.3.4 Valve Boxes

Except where indicator posts are provided, for each buried valve, provide cast-iron, ductile-iron, or plastic valve box of a suitable size. Plastic boxes shall be constructed of acrylonitrile-butadiene-styrene (ABS) or inorganic fiber-reinforced black polyolefin. Provide cast-iron, ductile-iron, or plastic cover for valve box with the word "WATER" cast on the cover. The minimum box shaft diameter shall be 134 mm. Coat cast-iron and ductile-iron boxes with bituminous paint applied to a minimum dry film thickness of 0.254 mm.

2.3.5 Buried Utility Warning and Identification Tape

Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 76 mm minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall read "CAUTION BURIED WATER PIPING BELOW" or similar wording in both English and Italian languages. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.4 PIPE SLEEVES

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide 25 mm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of the sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire rated walls and fire rated floors, seal both ends of pipe sleeves or core-drilled holes with approved fire-proofing fill, void, or cavity material.

2.4.1 Sleeves in Masonry and Concrete

Provide steel pipe sleeves or Schedule 40 PVC plastic pipe sleeves. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth. Provide an annular clearance around the sprinkler riser where it passes through the concrete slab in accordance with NFPA 13.

2.4.2 Sleeves Not in Masonry and Concrete

Provide 0.55 mm galvanized steel sheet pipe sleeves.

2.5 ESCUTCHEON PLATES

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide polished stainless steel plates or chromium-plated finish on copper alloy plates in finished spaces. Provide paint finish on metal plates in unfinished spaces.

PART 3 EXECUTION

3.1 INSTALLATION

Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with UNI 9489, UNI 9490, UNI EN 12259-1, UNI EN 12259-2, UNI EN 12259-3, UNI EN 12259-4, NFPA 13D[,]

[and] NFPA 13R, [and NFPA 13,] except as modified herein. Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings. Keep the interior and ends of new piping and existing piping affected by Contractor's operations thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter. Inspect piping before placing into position. Provide Teflon based pipe thread sealant or Teflon tape on male pipe threads only.

3.1.1 Electrical Work

Provide electrical work associated with this section under Section 16402, "Interior Wiring Systems," except for fire alarm wiring. Provide fire alarm system under Section 13852, "Interior Fire Alarm System." Provide wiring in rigid metal conduit or intermediate metal conduit, except electrical metallic tubing conduit may be used in dry locations not enclosed in concrete or where not subject to mechanical damage.

3.1.2 Disinfection

Disinfect the new water piping and existing water piping on the supply side of the backflow preventer affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 milligram per kilogram of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 milligram per kilogram, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit results prior to the new water piping being placed into service. Disinfection of systems supplied by nonpotable water is not required.

3.1.3 Wet Tap Connections to Existing Underground Water Supply Systems

Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around the main piping; bolt valve to the branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service. Notify the Contracting Officer in writing at least [_____] [15] working days prior to connection date; receive approval before any service is interrupted. Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labor as required. [Furnish] [The Government will furnish only] the labor and the tapping or drilling machine for making the actual connections to existing systems. Underground mains and lead-in connections to system risers shall be flushed before a connection is made to the sprinkler piping.

3.1.4 Buried Piping System

Bury tape with the printed side up at a depth of 305 mm below the top surface of earth or the top surface of the subgrade under pavements.

3.2 FIELD PAINTING

**NOTE: Use these paragraphs for steel sprinkler
piping systems.**

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, steel piping, conduit, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat of pretreatment primer applied to a minimum dry film thickness of 0.008 mm, and one coat of zinc molybdate primer applied to a minimum dry film thickness of 0.025 mm. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

3.2.1 Piping in Unfinished Areas

Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 0.025 mm in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material. [In lieu of red enamel finish coat, provide piping with 50 mm wide red enamel bands or self-adhering red plastic bands spaced at maximum of 6 meter intervals.]

3.2.2 Piping in Finished Areas

Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 0.025 mm. Provide piping with 51 mm wide red enamel bands or self-adhering red plastic bands spaced at maximum of 6 meters intervals throughout the piping systems.

3.3 FIELD QUALITY CONTROL

Perform test to determine compliance with specified requirements in the presence of the Contracting Officer. Test, inspect, and approve piping before covering or concealing.

3.3.1 Preliminary Tests

**NOTE: Hydrostatic testing at 1379 kPa is not
required for NFPA 13D systems unless pumper
connections are provided.**

[Hydrostatically test each system at 1379 kPa (gage) for a 2 hour period with no leakage or reduction in pressure.] Flush piping with potable water in accordance with UNI 9489 and [NFPA 13D] [NFPA 13R]. Piping above

suspended ceilings shall be tested, inspected, and approved before installation of ceilings. Test the alarms and other devices. Test the water flow alarms by flowing water through the inspector's test connection.

When tests have been completed and corrections made, submit a signed and dated certificate, similar to that specified in [NFPA 13D] [NFPA 13R].

3.3.2 Formal Tests and Inspections

Do not submit a request for formal test and inspection until the preliminary test and corrections are completed and approved. Submit a written request for formal inspection at least [_____] [15] working days prior to inspection date. An experienced technician regularly employed by the system installer shall be present during the inspection. At this inspection, repeat any or all of the required tests as directed. Correct defects in work provided by the Contractor, and make additional tests until the systems comply with contract requirements. Furnish appliances, equipment, [water,] electricity, instruments, connecting devices, and personnel for the tests. The Government will furnish water for the tests.

EFAMED, Naval Facilities Engineering Command, Fire Protection Engineer, will witness formal tests and approve systems before systems are accepted.

-- End of Section --